nucleus.—Figs. 2, 3. Embryo-sacs just before the flower opens, measuring .152mm in length.—Fig. 4. Antipodal cells divided, the two upper by oblique walls.—Fig. 5. Elongated nucleus of the lower antipodal cell.—Fig. 6. Peculiar condition of antipodal cells; the wall x well developed; x',x', very delicate.—Fig. 7. Embryo-sac at the time of fertilization, .216mm long by .048mm wide.—Figs. 8, 11. Upper part of embryo-sac showing egg-apparatus, endosperm nucleus and pollen tube.—Fig. 12. Fertilized egg; synergidae disappearing.—Fig. 13. Embryo-sac with two-celled embryo.—Fig. 18. Embryo further developed, surrounded by endosperm tissue. Figs.—14, 17. Embryos in different stages of development; 1—1 primary transverse wall.—Figs. 19–20. Transverse section of upper end of young embryo; in 19a and 20 the four cells forming the inner circle are the plerome; the next outer row the periblem; and in 20 the outermost row the dermatogen.—Figs. 21–26, longitudinal sections of older stages of the embryo; in figs. 25 and 26 the heavier lines indicate the boundary between plerome and periblem.—Fig. 27, two endosperm cells.

Descriptions of new species of Uredineæ and Ustilagineæ, with remarks on some other species. I.

P. DIETEL.

The following described species of fungi, principally Uredineæ, have been collected by Mr. E. W. D. Holway and some other collectors in California and several other portions of the United States. Three other new species, namely, *Uromyces aureus* Diet. and Holw., *Puccinia Holwayi* Diet., and *Puccinia Delphinii* Diet. and Holw., have already been published in Hedwigia, XXXII (1893). 29, 30.

Ustilago Holwayi Diet. n. sp.—Spore masses black-brown, pulverulent, destroying the whole inflorescence. Spores subglobose or obovate, brown, with large warts, 8–13μ in diameter.

On *Hordeum pratense*. Camp Badger, Calif., July, 1892, leg. *Holway*.

From the similar *Ustilago Lorentziana* Thüm. (Mycotheca univ. no. 1711) this differs, as an examination has shown, by the shape of the epispore.

Puccinia rufescens Diet. and Holw. n. sp.—Spots none. Æcidia forming loose and irregular groups, or isolated on both sides of the leaves. Pseudoperidia hemispherical, with decaying edges, composed of oblong, loosely aggregated cells. Æcidiospores mostly ovoid or obovate, with a light brownish membrane, containing orange red protoplasmic contents,

minutely verrucose, 18–25×17–20μ. Teleutospores: sori amphigenous, mostly around the aecidial groups, reddish brown, pulverulent, first covered by the elevated epidermis, soon naked, irregular in form and size, measuring from 1–6^{mm}. Spores rounded at the apex and base, distinctly constricted at the septum, with a tuberculated epispore, apical thickening little or none, 32–46×21–31μ. Pedicels hyaline, very deciduous, as long as the spores. Unicellular spores are of frequent occurrence.

On leaves and bracts of *Pedicularis semibarbata.* Kings River Cañon, Calif., July 15, 1892, leg. *Holway.*

This is the third Puccinia known at the present time on Pedicularis. The other two are *Puccinia Clintoni* Peck on *Pedicularis Canadensis* in America, and *Puccinia Pedicularis* Thüm. on *Pedicularis Œderi* in Asia. The American species differs in having a smooth epispore with a papilla at the apex, the Asiatic by the form of the teleutospores. In neither have æcidia been observed.

Puccinia intermedia Diet. and Holw. n. sp.—Spots none; sori amphigenous, circular, 0.33–0.75^{mm} in diameter, scattered, sometimes confluent, dark brown, containing uredo- and teleutospores. Uredospores broadly ovate or subglobose, finely echinulate, brown, 21–23×17–23μ. Teleutospores oblong, mostly rounded on both sides, sometimes protracted in a hyaline papilla at the apex, distinctly constricted at the septum, verrucose, brown, apical thickening not very considerable, often nearly wanting, 32–40×17–23μ. Pedicels deciduous.

On *Epilobium* sp. Kings River Cañon, Calif., July, 1892, leg. *Holway.*

Puccinia intermedia is in some respects intermediate between *Puccinia pulverulenta* Grev. and *Puccinia Epilobii* DC. From P. Epilobii it differs in the manner of attacking the host plant, in possessing a uredosporic fructification and having the spores much less constricted; P. pulverulenta differs by the smooth epispore and other properties of the teleutospores.

Puccinia Californica Diet. and Holw. n. sp.—Sori amphigenous, scattered, without discoloration of the nourishing plant, almost concealed by the pubescence of the host plant, if occurring on the under side of the leaves; roundish or oblong, ca. 1^{mm} in diameter. Uredospores very uniform, globose or shortly elliptical, dark brown, very thickly but finely

echinulate, 26–31×26μ. Teleutospores forming black sori; spores rounded on both sides or somewhat attenuated below, slightly constricted, chestnut brown, thickened very slightly, if at all, around the apical germ-pore, tuberculated, 42–52×26–36μ. Pedicels long (up to 125μ), colorless, rather deciduous. Amongst the bicellular teleutospores occur often unicellular ones.

On *Cnicus Breweri*. Kings River Cañon, Calif., July 14, 1892, leg. *Holway*.

From all similar species on Compositæ known to the writer this Puccinia is easy to be distinguished by the darker colored and much more densely echinulate epispore of the uredoform. In the form and size of the teleutospores it has most resemblance to the European *Puccinia Cirsii lanceolati* Schröt.

Puccinia Cymopteri Diet. and Holw. n. sp.—Attacking all parts of the host plant. Sori black-brown, very pulverulent, soon naked, at first covered by the grayish epidermis. Teleutospores ovate or oblong, sometimes irregular, rounded on both sides, hardly constricted in the middle, slightly verrucose, deep brown, 33–45×20–27μ. Pedicels short, deciduous.

On *Cymopterus terebinthinus*. Kings River Cañon, Calif., July, 1892, leg. *Holway*.

This species is distinctly different from *Puccinia Jonesii* Peck, which in Dr. Farlow's Provisional Host-Index is said to occur on *Cymopterus bipinnatus*.

Puccinia Polemonii Diet. and Holw. n. sp.—Amphigenous, sori roundish, scattered, 0.5–2.5^{mm} in diameter. Two kinds of teleutospores are formed; the ones, principally in the centre of the sori, with a colorless or nearly colorless membrane thickened at the apex and with firm long pedicels, germinating directly, are fusiform and little constricted at the septum before germinating; the others, with deciduous pedicels, germinating, as it seems, only after a period of rest, are yellowish brown in color, obovate or fusiform, distinctly constricted and surmounted with a conical, hyaline papilla. Epispore smooth, 29–45×12–17μ. On an average the colored spores are broader than the colorless ones.

On leaves of *Polemonium cæruleum*. Kootenai County, Idaho, July, 1892, leg. *J. H. Sandberg*.

PUCCINIA CLARKIÆ Peck.—Of this species, not recorded by De Toni in Saccardo's Sylloge Fungorum, hitherto only

teleutospores have been described. Mr. Holway has collected beautiful specimens of this fungus on *Clarkia elegans* in California (Camp Badger) with uredo- and teleutospores and has sent me, too, a specimen on *Clarkia pulchella* with uredospores from Idaho, collected by Mr. Geo. B. Aiton. From these the following description is taken. Sori hypophyllous, the teleutospore layers often arranged into circles, rather long, covered by the elevated epidermis. Uredospores broadly ovate or nearly spherical, brown, echinulate, 22–29× 18.5–25μ. Teleutospores oblong, upper cell rounded or obconical, sometimes with a distinct papilla, thickened at the apex in different degrees, lower cell rounded or somewhat attenuated below, central constriction little, epispore smooth, chestnut brown, 37–50×20–25μ. Pedicels firm, long.

UROMYCES BOREALIS Peck on *Hedysarum boreale* and *Hed. Mackenzii* agrees in all respects with the European *Uromyces Hedysari obscuri* (DC.).

Uredo *(Melampsora?)* **Arbuti** Diet. and Holw. n. sp.— Hypophyllous, sori densely aggregated into irregular groups, or scattered over the greater part of the leaf, not confluent, hemispherical before the epidermis is ruptured, minute, ca. 0.2^{mm} in diameter. Spores pyriform or club-shaped, colorless, filled with orange red granular protoplasm, echinulate, 28–55×15–22μ.

On *Arbutus Menziesii*. Mt. Tamalpais, Calif., April 1, 1893, leg. *W. C. Blasdale.*

Judging from the size of the spores and the general appearance, this Uredo belongs to a Melampsora.

On *Valerianella congesta* Mr. W. C. Blasdale has collected an æcidium in California (Mill Valley), which is probably the *Æcidium Valerianellæ* Biv. Bernh. The pseudoperidia are scattered over the whole underside of the leaves. The spores, appearing, if examined dry, very minutely verrucose, are subglobose or ovate and measure 17–27×15–20μ.

Leipzig, Germany.